ECHOGRAPHIC DIAGNOSIS OF PNEUMONIA IN CHILDREN

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https://doi.org/10.5281/zenodo.17875609

ARTICLE INFO

Received:8th December 2025
Accepted: 9th December 2025
Online: 10th December 2025

KEYWORDS

ABSTRACT

The problem of pneumonia diagnosis remains relevant today. High incidence rates and significant mortality rates from acute pneumonia (AP) impact life expectancy and quality of life in the country.

The purpose of the study. is to optimize the diagnosis of pneumonia in children by using echographic scanning in a comprehensive patient examination system.

Materials and methods of research. This study is based on the results of a comprehensive clinical and laboratory examination of 75 children with pneumonia, conducted at the Tashkent Pediatric Medical Institute (TashPMI). Chest ultrasound examinations were performed using Acuson (USA) and Sonoscape 5000 (China) ultrasound systems, primarily with linear transducers and, when necessary, convex and sector transducers with frequencies of 3.5-5-7.5 MHz.

Results. The study revealed that in the vast majority of cases, lung involvement was bilateral (86.8%). Right-sided pneumonia was noted in 9.8% of children, and left-sided pneumonia in 3.4%. In all children with pneumonia, chest radiography revealed a darkened lung field, the size of which depended on the extent of the lesion. To determine the nature of the darkened lung field, chest ultrasound was performed.

Air-filled lung tissue is impenetrable to ultrasound waves, and airless areas of lung tissue are clearly visualized by ultrasound. Alveolar gas completely reflects ultrasound, and ultrasound visualization of intact lung parenchyma is impossible. However, during inflammation, the alveoli fill with exudate, interstitial edema occurs, and blood flow increases. Due to this, the lung tissue becomes airless and accessible for ultrasound examination.

Clinically and sonographically, 84% of patients were diagnosed with focal pneumonia, 4.5% with focal confluent pneumonia, 10.5% with polysegmental pneumonia, and 1% with lobar pneumonia.

In 100% of patients, the inflammatory lung infiltrate was visualized as a parenchymatous hypoechoic area with clear, smooth outer contours. Intrapulmonary contours were unclear due to the air-filled pulmonary parenchyma adjacent to the infiltrate. The shape of the pneumonic lesion varied. In focal pneumonia, it was round or irregular in shape; in focal confluent pneumonia, airless foci of reduced echogenicity were observed that merged with each other; in polysegmental pneumonia, it was pyramidal with a base facing the pleura; in lobar pneumonia, it followed the shape of the lobe. In 71.4% of patients with pulmonary infiltrates on the affected side, ultrasound revealed a small accumulation of fluid in the pleural cavity, with pleural separation of no more than 15 mm.

In patients with polysegmental pneumonia, dynamic echographic monitoring revealed several small anechoic inclusions, no larger than 2-4 mm in size (forming foci of lung tissue destruction), within

the pulmonary infiltrate within one or more lobes. This echographic appearance correlated with negative clinical progression. During subsequent ultrasound follow-ups, these foci gradually decreased in size and number and eventually disappeared.

All children underwent regular dynamic echographic monitoring of the pneumonic lesion and pleural cavity while undergoing comprehensive intensive care.

In 78.0% of children, the following echographic criteria of recovery were observed during dynamic ultrasound examination: the pulmonary infiltrate gradually decreased in size, its edges became indistinct and blurred, and the number of visualized small air-filled bronchi increased—that is, pneumatization of the lung tissue was restored. Pneumatization occurred from the root of the lung outward. The amount of exudate in the pleural cavity on the affected side also gradually decreased in size, and in cases of recovery, the effusion was no longer visualized.

Conclusions: Thus, according to our data, the diagnostic accuracy of echography in diagnosing uncomplicated pneumonia was 96.7%+1.3%, while that of plain radiography was 80.2%+3.0%. Studies show that echography is superior to plain radiography in diagnosing inflammatory infiltrates in uncomplicated pneumonia in children. Echography allowed us to determine the nature of the radiographic darkening and, if an inflammatory infiltrate was detected, to monitor the progress of treatment without the need for repeat radiographic examinations. Chest echography in children can be successfully used in medical and diagnostic facilities equipped with ultrasound equipment.

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